

Specification 5100-108e  
August 1996  
Superseding  
Specification 5100-108d  
December 1980

**UNITED STATES DEPARTMENT OF AGRICULTURE**  
**FOREST SERVICE**  
**SPECIFICATION FOR**  
**COUPLINGS, LIGHTWEIGHT, FIRE AND SUCTION HOSE**

1. SCOPE.

1.1. Scope. The lightweight couplings described in this specification are for use on USDA Forest Service qualified fire hose and on Forest Service suction hose. Coupling thread series designations are 1 inch 11-1/2 NPSH, 1-1/2 inches 9 NH and 2-1/2 inches 7-1/2 NH.

2. APPLICABLE DOCUMENTS.

2.1. Government Documents. The following specifications, standards, and handbooks form a part of this document to the extent specified herein. Unless otherwise specified, the issues of these documents are those in effect on the date of the invitation for bids or request for proposals (see 6.2).

USDA Forest Service Standard

5100-190 - Threads, Gaskets, Rocker Lugs, Connections and Fittings, Fire Hose

USDA Forest Service Specifications

5100-184 - Suction Hose

5100-186 - Fire Hose, Cotton-Synthetic, Lined, Woven Jacket, 1 Inch and 1-1/2 Inch

5100-187 - Fire Hose, Lightweight Synthetic, Lined, Woven Jacket, 1 Inch and 1-1/2 Inch

Federal Specifications

QQ-A-225 - Aluminum and Aluminum Alloy Bar, Rod, Wire, or Special Shapes; Rolled, Drawn, or Cold Finished; General Specification for

QQ-A-225/10 - Aluminum Alloy Bar, Rod, and Wire; Rolled, Drawn, or Cold Finished, 6262

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Beneficial comments, recommendations, additions, deletions and any pertinent data that may be used in improving this document should be addressed to: USDA Forest Service, San Dimas Technology and Development Center, 444 East Bonita Avenue, San Dimas, CA 91773-3198 by using the Specification Comment Sheet at the end of this document or by letter.

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Copies of federal specifications are available from General Services Administration, Federal Supply Service Bureau, Specification Section, Suite 200, 470 East L'Enfant Plaza SW, Washington DC 20407.

Copies of USDA Forest Service Specifications and Standards are available from USDA Forest Service, San Dimas Technology and Development Center, 444 East Bonita Avenue, San Dimas, CA 91773-3198.

2.2. Non-Government Publications. The following documents form a part of this document to the extent specified herein. Unless otherwise specified, the issues of these documents are those in effect on the date of the invitation for bids or request for proposals.

American National Standards Institute Inc. (ANSI)/American Society For Quality Control (ASQC)

Z 1.4 - Sampling Procedures and Tables for Inspection by Attributes.

Address requests for copies to the American National Standards Institute Inc., 11 West 42nd Street, New York, NY 10036.

American Society for Testing and Materials (ASTM)

B 26 - Aluminum-Alloy Sand Castings

B 221 - Aluminum-Alloy Extruded Bars, Rods, Wire, Shapes, and Tubes

B 241 - Aluminum and Aluminum-Alloy Seamless Pipe and Seamless Extruded Tube

E 380 - Practice for Use of the International System of Units

Address requests for copies to American Society for Testing and Materials, 100 Barr Harbor Drive, West Conshohocken, PA 19428-2959.

Non-Government standards and other publications normally are available from the organizations that prepare or distribute the documents. These documents also may be available in or through libraries or other informational services.

2.3. Order of Precedence. In the event of conflict between the text of this document and the references cited herein, the text of this document takes precedence. Nothing in this document, however, supersedes applicable laws and regulations unless a specific exemption has been obtained.

### 3. REQUIREMENTS.

3.1. Qualified Products List Number. The bidder shall possess a currently valid notice of qualification with associated Qualified Products List (QPL) number obtained in accordance with 4.1. The date of issue on the QPL number shall precede the date on the invitation for bids.

3.2. Construction. The hose coupling shall consist of the male and female sections, swivel, and gasket. Hose coupling sizes shall be 1 inch 11-1/2 NPSH, 1-1/2 inch 9 NH, and 2-1/2 inch 7-1/2 NH. Components shall be as shown in Figure 1.

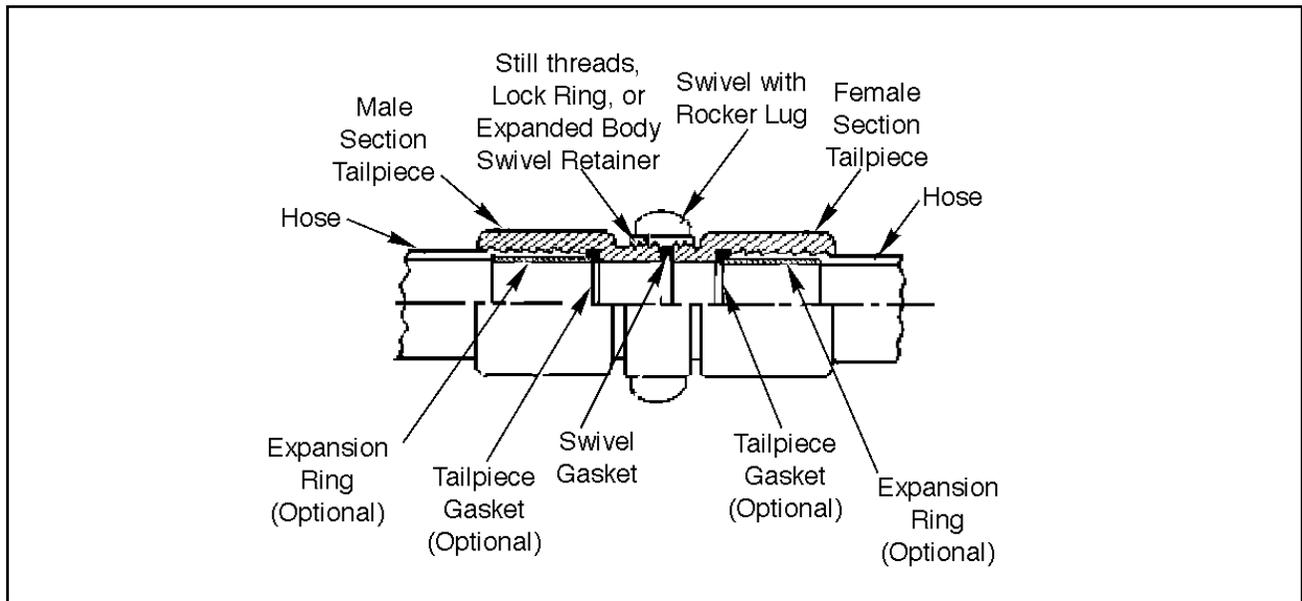


Figure 1. Coupling configuration.

3.2.1. Coupling Tailpiece Sections. The male and female tailpiece sections shall not have any ridges or grooves running across serration of the inside walls. The rim of the tailpieces shall be smooth and well-rounded, without any sharp edges.

3.2.2. Coupling Swivel. A swivel shall be installed on the female tailpiece. The swivel shall be designed with a tolerance to permit free turning by a light twisting action before and after the tension and pressure tests of 4.7.2 and 4.7.4. The 2-1/2 inch 7-1/2 NH coupling shall have 3 rocker lugs.

3.2.3. Optional Coupling Expansion Ring and Tailpiece Gasket. The use of expansion rings and associated tailpiece gaskets are optional.

3.3. Materials. Where more than one type of material is used in various components, there shall be no incompatibility between materials which may cause corrosion.

3.3.1. Coupling Tailpiece and Swivel Section Material. Tailpiece and swivel section material shall conform to the following:

- a. Aluminum alloy, 6061-T6, in accordance with ASTM B 221 and B 241 or
- b. Aluminum alloy, 6061-T6, in accordance with Federal Specification QQ-A-367 or
- c. Aluminum alloy, 356-T6, in accordance with ASTM B 26 or
- d. Aluminum alloy, 6262-T9, in accordance with Federal Specifications QQ-A-225 and QQ-A-225/10.

3.3.2. Expansion Ring Material. If expansion rings are used, they may be made of any material, providing the performance requirements of 3.10 are complied with and the weight limitations are not exceeded.

3.3.3. Tailpiece Gasket Material. If expansion rings with associated tailpiece gaskets are used, tailpiece gasket material physical properties shall meet the requirements of USDA Forest Service Standard 5100-190.

3.3.4. Gasket Material. Gasket material physical properties shall meet the requirements of USDA Forest Service Standard 5100-190.

3.3.5. Recoverable Materials. The contractor is encouraged to use recovered materials to the maximum extent practicable, in accordance with paragraph 23.403 of the Federal Acquisition Regulation (FAR), provided all performance requirements of this specification are met.

3.4. Dimensions and Weights. Coupling dimensions shall be in accordance with USDA Forest Service Standard 5100-190. The maximum weight for a complete set of male and female hose couplings without hose, for the 1 inch 11-1/2 NPSH coupling set shall not exceed 6 ounces (170 g), for the 1-1/2 inch 9 NH coupling set shall not exceed 14 ounces (397 g) and the 2-1/2 inch 7-1/2 NH coupling set shall not exceed 2 pounds (908 g).

3.4.1. Expansion Ring and Tailpiece Gasket. If an expansion ring and tailpiece gasket are used, the expansion ring shall be sized to fit within the inside diameter of hose and coupling tailpiece; and the tailpiece gasket shall conform to the minimum inner diameter for gaskets, as specified in the USDA Forest Service Standard 5100-190. The tailpiece gasket outer diameter shall accurately fit the recess provided and shall have a minimum thickness of 0.188 inch (4.8 mm).

3.4.2. Dimensional Tolerance. Unless otherwise noted, the following tolerances apply: one place (x.x) +/- 0.1 inch (2.5 mm); two places (x.xx) +/- 0.01 inch (0.25 mm) and three places (x.xxx) +/- 0.010 inch (0.254 mm).

3.5. Workmanship. Workmanship shall be equal to the best commercial practices consistent with the highest engineering standards in the industry and shall be free from any defect which may impair serviceability or detract from the product's appearance.

3.5.1. Symmetry. All metal part sections shall be symmetrical and concentric to 0.030 inch (0.762 mm).

3.5.2. Extruded Components. Extruded sections shall be free from laps, sharp die marks, cracks or other defects.

3.5.3. Cast Components. Cast parts shall be fine-grained, free from blowholes, pinholes, pits, porosity, hard spots, shrinkage, cracks or other defects.

3.6. Threads, Waterways, Gaskets, Gasket Recesses and Rocker Lugs. All threads, waterways, gaskets, gasket recesses and rocker lugs shall be in accordance with USDA Forest Service Standard 5100-190.

3.7. Marking. Markings shall be in accordance with USDA Forest Service Standard 5100-190.

3.8. Surface Treatment. Aluminum alloy surfaces, to include threaded surfaces, shall be hardcoated in accordance with USDA Forest Service Standard 5100-190.

3.9. Surface Finish. The finish for all surfaces, to include threaded surfaces, shall be in accordance with USDA Forest Service Standard 5100-190.

3.10. Performance.

3.10.1. Coupling Set Tensile Strength. When tested in accordance with 4.7.2, coupling sets with and without hose shall be tested for tensile strength.

3.10.1.1. Coupling Set With Hose, Tensile Strength. When tested in accordance with 4.7.2.1, there shall be no permanent deformation, mechanical damage or structural failure of any component parts, under a tensile load of up to 2,000 pounds per inch (35,700 kg/m) of hose diameter. In addition, the swivel section shall turn freely before and after tension strength testing.

3.10.1.2. Coupling Set Without Hose, Tensile Strength. When tested in accordance with 4.7.2.2, there shall be no permanent deformation, mechanical damage or structural failure of any component parts, under a tensile load of up to 1,200 pounds per 1 inch (21,420 kg/m) of hose diameter. In addition, the swivel section shall turn freely before and after tension strength testing.

3.10.2. Vacuum Requirement for Suction Hose. If suction hose is installed on the sample test item as submitted, when tested in accordance with 4.7.3, the sample test item shall withstand the minimum vacuum indicated in Table 1 with no leaks, permanent deformation, mechanical damage or structural failure.

Table 1. Proof Pressure and Minimum Vacuum Test Values

Thread Series Designation	Cotton-Synthetic and Lightweight Synthetic Fire Hose Forest Service Specifications 5100-186 and 5100-187		Suction Hose Forest Service Specifications 5100-184	
	Proof Pressure		Proof Pressure	Minimum Vacuum
	psig	(kPag)	psig (kPag)	Hg-in (KPa)
1 inch 11-1/2 NPSH	900	(6205)	200 (1379)	25 (84.7)
1-1/2 inch 9 NH	900	(6205)	200 (1379)	25 (84.7)
2-1/2 inch 7-1/2 NH	~		200 (1379)	25 (84.7)

3.10.3. Proof Pressure. When tested in accordance with 4.7.4, the hose coupling shall withstand the proof pressure indicated in Table 1, with no leaks, permanent deformation, mechanical damage or structural failure. In addition, the swivel section shall turn freely before and after proof pressure testing.

3.10.4. Expansion Ring Requirement. When an optional expansion ring is used, it shall be tested in accordance with 4.7.5. Upon expansion, the inside diameter shall not be less than the waterway indicated in USDA Forest Service Standard 5100-190 for the respective size coupling. In addition, there shall be no defects, mechanical damage or structural failure.

3.11. Metric Products. Metric dimensions are provided for information only, inch-pound units shall be the required units of measure for this specification. Thread series designations are indicated as 1 inch 11-1/2 NPSH, 1-1/2 inch 9 NH and 2-1/2 inch 7-1/2 NH. Since these are thread series designations, not an indication of specific dimensions, the metric equivalents are not given. Products manufactured to metric dimensions will be considered on an equal basis with those manufactured using inch-pound units, provided they fall within the tolerances specified using conversion tables contained in the latest revision of ASTM E 380, and all other requirements of this specification are met.

#### 4. SAMPLING, INSPECTION AND TEST PROCEDURES.

##### 4.1. Qualification Testing.

4.1.1. Manufacturer Submission for Qualification Tests. The prospective contractor shall provide, without cost to the Government:

- a. Five complete sets or one reproducible set of detailed dimensional drawings and specifications.
- b. Coupling test samples shall be submitted as follows: If couplings are submitted by the manufacturer installed on USDA Forest Service Specification 5100-186 or 5100-187 qualified fire hose, a total of three coupling sets shall be submitted. The two of the coupling sets shall be submitted shall be installed on the fire hose of lengths of 18.0 inches (0.46 m), and the other coupling set shall be submitted not installed on hose. If suction hose meeting USDA Forest Service Specification 5100-184 is submitted, the two hose lengths shall be 6 foot (1.8 m) and 10 foot (3.05 m) long, in addition to a coupling set submitted not installed on hose.
- c. Expansion ring and tailpiece gasket. If an expansion ring and tailpiece gasket are used in the construction of the coupling, a sample of each shall be submitted.
- d. The estimated test fee. Contact the Water Handling Project Leader at the USDA Forest Service, San Dimas Technology and Development Center (SDTDC), 444 East Bonita Avenue, San Dimas, CA 91773-3198.
- e. A signed collection agreement. Contact the SDTDC Water Handling Project Leader for a copy of the form.
- f. All of the above items shall be delivered to SDTDC to the attention of the Water Handling Project Leader. The Government will not be responsible for the submitted test samples.

4.1.2. Qualification Test. Qualification inspection and tests shall be conducted by the Government and at the expense of the contractor at a fee to be determined by the Government. If requested by the contractor, the Government will inform the contractor of date and place of inspection and tests. The contractor may send a representative (who has been designated in writing) to be present and observe the inspection and tests, but they shall not be permitted to be a participant. Upon completion of tests, the sample shall be retained by the Government. Qualification testing shall stop on a single failure and the test sample rejected. The contractor will be informed as to the nature of the failure. The Government shall not be obligated to continue testing a defective item once it is known to be defective, or when it is considered to be in the best interest of the Government.

4.1.3. Notice of Qualification. Notice of Qualification shall be issued to the contractor upon successful completion of qualification tests. Copies of qualification notices shall be provided to the General Services Administration. A copy shall be retained in the SDTDC file.

4.1.4. Notice of Failure to Qualify. The contractor shall be notified by letter of failure to qualify when the submitted coupling set does not meet the requirements of this specification.

4.1.5. Re-qualification. After qualification, if any changes are made in the product or where it is manufactured, the contractor shall notify the SDTDC immediately in writing. The need for re-qualification shall be determined by the Government when changes are made to the product or this specification.

4.2. General Inspection and Tests. Unless otherwise specified in the contract or purchase order, the contractor is responsible for performance of all inspection requirements prior to submission for Government acceptance inspection and tests. The contractor may utilize their own facilities or any commercial laboratory acceptable to the Government. Inspection records of the examination and tests shall be kept complete and available to the Government.

4.2.1. Inspection and Test Site. The Government shall conduct lot acceptance inspection and tests to determine compliance with the specification. If lot acceptance and tests are conducted at locations other than the manufacturing facilities, the contracting officer will specify location and arrangements. In the case of on-site inspections at the contractor's facility, the contractor shall furnish the inspector all reasonable facilities for their work. During any inspection, the inspector may take from the lot one or more samples and submit them to an independent test laboratory approved by the Government or to a Government test facility for inspection and tests.

4.2.2. Testing With Referenced Documents. The contractor is responsible for insuring that components and materials used were manufactured, examined and tested in accordance with referenced specifications and standards. The Government reserves the right to perform any of the inspections or tests set forth in this section where such action is deemed necessary to assure supplies and services conform to prescribed requirements. All inspection or testing of a sample shall stop upon a single failure and the sample rejected. The contractor will be informed as to the nature of the failure. The Government shall not be obligated to continue testing a defective item once it is known to be defective or when it is considered to be in the best interest of the Government.

4.3. Responsibility for Compliance. All items shall meet all requirements of sections 3 and 4. The inspection set forth in this specification shall become a part of the contractor's overall inspection system or quality program. The absence of any inspection requirements in this specification shall not relieve the contractor of the responsibility of ensuring that all products or supplies submitted to the Government for acceptance comply with all requirements of the contract. Sampling inspection, as part of manufacturing operations, is an acceptable practice to ascertain conformance to requirements, however, this does not authorize submission of known defective material, either indicated or actual, nor does it commit the Government to accept defective material.

4.4. Sampling for Inspection. When inspection is performed, sampling shall be in accordance with ANSI/ASQC Z 1.4.

4.4.1. Lot. All coupling sets of one size presented together in one delivery will be considered a lot for the purpose of inspection. A sample unit shall be one coupling set.

4.4.2. Sampling for Visual and Dimensional Examination. Sampling for visual and dimensional examination shall be S-3, with an Acceptable Quality Level (AQL) of 1.5 percent defective.

4.4.3. Sampling for Lot Acceptance Tests. Sampling for lot acceptance testing shall be S-3 with an AQL of 1.5 percent defective.

4.5. Inspection and Tests.

4.5.1. Visual and Dimensional Examination. When selected in accordance with 4.4.2, each sample coupling set shall be visually and dimensionally examined to determine conformance with this specification. Visual or dimensional defects shall be classified as major or minor. A defect not listed in Table 2 will be classified as a minor defect. If the number of defects in any sample exceeds the indicated AQL, the lot shall be rejected.

Table 2. Major and Minor Defects

Defect	Classification	
	Major	Minor
1. Hose coupling set not complete.	X	
2. Thread dimensions not within specified tolerances and failure to pass gage tests.	X	
3. Swivel too loose or too tight.	X	
4. Expansion ring waterway not as required.	X	
5. Dimensions and weights not as required.	X	
6. Workmanship and finish not as required.	X	
7. Materials not as required.	X	
8. Threads not smooth or otherwise free of imperfections.		X
9. Illegible or improper marking.		X

4.5.2. Lot Acceptance Tests. Each of the samples selected in accordance with 4.4.3, will be tested in accordance with 4.7, to determine conformance with the requirements of this specification.

4.5.3. Quality Conformance Inspection. Unless otherwise specified, sampling for inspection shall be performed in accordance with ANSI/ASQC Z 1.4. The inspection level and AQL shall be as specified in 4.4.3.

4.6. Certificate of Conformance. A Certificate of Conformance shall meet the requirements of USDA Forest Service Standard 5100-190. Where certificates of conformance are required, the Government reserves the right to verify test any such items to determine the validity of certification. These certificates shall be based on the testing of component materials and may be performed by the component material supplier. The contractor shall provide certificates of conformance for all materials used in 3.3.1, 3.3.3, 3.3.4 and 3.8 (see 4.6.2, 4.6.3, 4.6.4 and 4.6.5).

4.6.1. Certificates of Conformance in Lieu of Testing. Unless otherwise specified, certificates of conformance may be acceptable in lieu of testing end items.

4.6.2. Coupling Tailpiece and Swivel Section Material. As required by 3.3.1, coupling tailpiece and swivel section material shall meet the indicated material physical property requirement listed, when tested to defined test method.

4.6.3. Tailpiece Gasket Material Test. As required by 3.3.3, tailpiece gasket material physical properties shall meet the requirements of USDA Forest Service Standard 5100-190.

4.6.4. Gasket Material Test. As required by 3.3.4, gasket material physical properties shall meet the requirements of USDA Forest Service Standard 5100-190.

4.6.5. Surface Treatment. As required by 3.8, aluminum alloy surfaces, to include threaded surfaces, shall be hardcoated in accordance with USDA Forest Service Standard 5100-190.

4.7. Performance Testing. Samples shall be subjected to the following tests to determine if the samples meet the requirements of this specification. A new test sample shall be used for each separate test.

4.7.1. Fluid Medium. All testing requiring the use of a fluid medium shall be performed using municipally supplied potable water; this shall include, but is not limited to proof pressure testing. If the contractor does not have access to a municipal water supply, the testing shall be performed using any clear fresh water normally available for firefighting. Testing performed by the Government will be conducted using municipally supplied potable water.

4.7.2. Coupling Set Tensile Strength Tests. As required by 3.10.1, the coupling sets with and without hose shall be tested for tensile strength.

4.7.2.1. Coupling Set With Hose, Tensile Strength Test. As required by 3.10.1.1, the sample hose with coupling male and female sections shall be connected together (male to female and with the swivel gasket in place) and installed on a tension testing machine. The couplings shall be positioned midpoint on a vertical section, as installed in the test stand fixture. A tensile load shall be applied up to 2,000 pounds per 1 inch (35,700 kg/m) of nominal hose diameter. The rate for applying the tensile load shall not exceed 2.0 inches (51 mm) per minute. There shall be no permanent deformation, mechanical damage or structural failure. In addition, the swivel section shall turn freely before and after tension strength testing.

4.7.2.2. Coupling Set Without Hose, Tensile Strength Test. As required by 3.10.1.2, the coupling sections without hose will be connected together (male to female and with the swivel gasket in place). Mandrels shall be installed on each end of the couplings. The couplings and mandrels shall be installed on a tension testing machine. A tensile load shall be applied up to 1,200 pounds per 1 inch (21,420 kg/m) of nominal hose diameter. The rate for applying the tensile load shall not exceed 0.25 inch (6.4 mm) per minute. There shall be no permanent deformation, mechanical damage or structural failure. In addition, the swivel section shall turn freely before and after tension strength testing.

4.7.3. Coupling Vacuum Test for Suction Hose. As required by 3.10.2, if suction hose is installed on the coupling set, as submitted, it shall be vacuum tested. The vacuum test shall be conducted in accordance to the vacuum test in USDA Forest Service Specification 5100-184.

4.7.4. Proof Pressure Test. As required by 3.10.3, the coupling set with hose shall be tested for proof pressure by using the coupling set installed on suction hose or USDA Forest Service qualified fire hose and attaching it to a water pressure source. Hydrostatic pressure shall be applied to the pressure indicated in Table 1 and held for 1 minute. The rate for applying hydrostatic pressure shall not be less than 300 psig (2068 kPag) per minute, and not more than 600 psig (4137 kPag) per minute. There shall be no leakage, permanent deformation, mechanical damage or structural failure. In addition, the swivel section shall turn freely before and after proof pressure testing.

4.7.5. Expansion Ring Test. As required by 3.10.4, when the optional expansion ring is used, it shall be tested. The ring shall be expanded on a hydraulic expander until the outside diameter has increased to 120 percent of the original diameter. Upon expansion the inside diameter shall not be less than the waterway indicated in USDA Forest Service Standard 5100-190 for the respective size coupling. There shall be no defects, mechanical damage or structural failure.

## 5. PACKAGING, PACKING AND MARKING.

5.1. Packaging, Packing and Marking. The packaging, packing and marking shall be as specified in the contract or order.

6. NOTES.

6.1. Intended Use. The lightweight hose couplings described in this specification are for use on USDA Forest Service qualified fire hose and USDA Forest Service suction hose.

6.2. Notice. When Government drawings, specifications, or other data are used for any purpose other than in connection with a related Government procurement operation, the United States Government thereby incurs no responsibility nor any obligation whatsoever.

6.3. Preparing Activity. USDA Forest Service, San Dimas Technology and Development Center, 444 East Bonita Avenue, San Dimas, CA 91773-3198.

United States Department of Agriculture, Forest Service  
Standardization Document Improvement Proposal

**Instructions:** This form is provided to solicit beneficial comments which may improve this document and enhance its use. Contractors, government activities, manufacturers, vendors, or other prospective users of this document are invited to submit comments to the USDA Forest Service, San Dimas Technology and Development Center, 444 East Bonita Avenue, San Dimas, California 91773-3198. Attach any pertinent data which may be of use in improving this document. If there is additional documentation, attach it to the form and place both in an envelope addressed to the preparing activity. A response will be provided when a name and address are included.

**Note:** This form shall not be used to submit request for waivers, deviation, or for clarification of requirements on current contracts. Comments submitted on this form do not constitute or imply authorization to waive any portion of the referenced document(s) or to amend contractual requirements.

Standard Number and Title: **Specification 5100-108e, Couplings, Lightweight,  
Fire and Suction Hose**

Name of Organization and Address:

\_\_\_\_\_ Vendor      \_\_\_\_\_ User      \_\_\_\_\_ Manufacturer

1. \_\_\_\_\_ Has any part of this document created problems or required interpretation in procurement use?  
\_\_\_\_\_ Is any part of this document too rigid, restrictive, loose or ambiguous?  
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Give paragraph number and wording:

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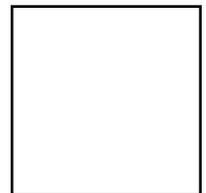
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(Optional)

Date:

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USDA Forest Service  
San Dimas Technology & Development Center  
Attn: Water Handling Project Leader  
444 East Bonita Avenue  
San Dimas, CA 91773-3198

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